DEPARTEMENT TOEGEPASTE ECONOMISCHE WETENSCHAPPEN

ONDERZOEKSRAPPORT NR 9824

THE EFFECT OF HUMAN CAPITAL ON THE START-UP AND GROWTH OF ENTREPRENEURIAL FIRMS; EVIDENCE FROM CÔTE D'IVOIRE

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D/1998/2376/24

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Abstract

This paper analyses the factors which determine individuals' choice into self-employment and the determinants of entrepreneurial success measured in terms of firm growth. A unique data set is used containing personal data of wage workers and entrepreneurs and data on entrepreneurial firms active in the manufacturing sector in Côte d'Ivoire. Entrepreneurial activity is found to be undertaken by individuals who succeed in increasing their entrepreneurial abilities and reducing the risk of starting a business through a learning process that takes place through ageing, professional experience, and apprenticeship or, alternatively, formal education. The learning process takes place both before and after entry into the industry, as firms grow into a larger size. Firms of entrepreneurs with higher levels of formal education grow more successfully as entrepreneurs catch up for the initial loss of on- the-job training and reach higher levels of entrepreneurial efficiency. However, entrepreneurship and firm growth are strongly affected by failures in the labour markets and financial markets. These market imperfections result in high transaction costs with a negative impact on growth opportunities of firms.

Keywords: entrepreneurship, learning, firm growth

JEL Codes: D83, D92, J24, O55

* This paper has been developed in the framework of the author's doctoral research. She would like to thank Leo Sleuwaegen for helpful comments and suggestions. Financial support from the Belgian Fund for Scientific Research (FWO-G.0196.96 N) is gratefully acknowledged.

Introduction

Entrepreneurship in developing countries has recently gained new attention in academic research. Public interest in this topic is high as entrepreneurship is found to play an important role in economic development. The massive failure of state owned enterprises (SOEs) in generating development has resuscitated the interest in the private sector, both modern and informal. The creation of small firms and the subsequent growth of these firms is considered essential for the establishment of a solid industrial base.

Using a unique data set on entrepreneurs and entrepreneurial firms this paper addresses two key aspects of entrepreneurship: it investigates the characteristics that distinguish entrepreneurs from wage workers and it examines the determinants of growth of the entrepreneurial[1] firms. Point of departure is the data set of the RPED survey[2] executed in Côte d'Ivoire. It contains data on the socio-economic and personal characteristics of over thousand individuals working in the manufacturing sector in Côte d'Ivoire in 1995. The data allow to model the factors that determine whether an individual chooses to be self-employed and start his own firm, or prefers to work as an employee. Furthermore historical sales data of a sample of entrepreneurial firms allow to analyse to what extent sales growth can be explained by firm specific and entrepreneur related factors. Table 1 in the appendix to this paper shows the size distribution of these firms by firm age, sector of activity, legal and formal status and ownership structure.

The structure of the paper is as follows. The first section develops an occupational choice model for individuals working in less developed labour markets, where both prospects for entrepreneurial profits and wage prospects are characterised by uncertainty. The model is then extended to include factors which affect an individual's inclination to start up a business. The second section subsequently tests the theoretical implications and analyses the distinguishing features of entrepreneurs in the Ivorian manufacturing sector. The determinants of firm growth are discussed in section three and tested against firm level data in section four. Section five concludes.

1. The decision to become an entrepreneur

Several theoretical models have been developed to highlight the motivational factors involved in an individual's occupational decision. Expected entrepreneurial profit or, alternatively, wages and managerial or working skills are the main factors advanced in these models. However, underdeveloped credit markets and a lack of infrastructure can install serious barriers to entrepreneurial initiatives. Empirical research in several disciplines has also shown that the decision to become entrepreneur is severely affected by the socio-economic environment and subject to cultural and psychological factors. In this section the basic theoretical models and empirical findings deemed relevant in this context are discussed.

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[1] The label of 'entrepreneurial firm' is given to firms owned by one or a few individuals who at the same time manage the firm. They are therefore explicitly distinguished from SOEs, subsidiaries, or firms of which the ownership is dispersed over a large number of people.

[2] The Regional Program on Enterprise Development (RPED) is a World Bank project conducted in several African countries. One of the objectives of the project consists of collecting firm level data which allow to analyse how the various elements of the African business environment influence enterprise behaviour and performance.

1.1. Occupational choice and entrepreneurship

The decision to become an entrepreneur has been studied within the framework of occupational choice models (Lucas, 1978; Oi, 1983; Blanchflower and Oswald, 1990; Jovanovic, 1994), in which individuals compare the wage they can earn to the entrepreneurial rent they can obtain by managing their own business. The rent entrepreneurs can create depends on their managerial abilities, which are unequally distributed over the population.

In their most basic form these models predict that the individual's propensity to become self-employed is positively influenced by his managerial abilities and negatively by the expected wage he could earn as a worker. Persons who are endowed with higher levels of managerial ability are more likely to become entrepreneur as their expected entrepreneurial rent exceeds the expected wage, which is assumed to equal a unique market wage.

More recent extensions of the models allow for heterogeneous quality of labour and differential wages. Jovanovic (1994) shows that the best potential entrepreneurs or managers might eventually end up as wage workers. This outcome occurs if managerial skills are highly positively correlated with working skills and wages related to the higher levels of working (and managerial) abilities are very high. Hence the wage structure determines whether the most endowed individuals become entrepreneurs.

The general equilibrium outcome does not only depend on the distribution of abilities and related compensation, but also on the efficiency of labour markets. Blau (1985) studied the determinants of self-employment in developing country labour markets. If regulations keep formal sector wages above market clearing levels and jobs are rationed, individuals with higher than average managerial ability also have better than average opportunities in wage employment. Individuals with relatively low managerial ability are forced to survive at a subsistence level by becoming self-employed in the low productivity 'informal sector'. In competitive labour markets the opposite outcome occurs.

In ill-developed markets the uncertainty related to finding a good job plays indeed an important role. Therefore the occupational decision at the individual level has to be studied within a stochastic framework where the outcome not only depends on the level of compensation related to different occupations, but also on the degree of uncertainty related to the alternative occupations and on the individual's attitude towards risk bearing. The decision to become entrepreneur will therefore be governed by the following rule about the risky prospects of making profits as an entrepreneur or earning a wage as an employee with their associated expected utilities.

$$E[U(p_i, e_i)] >= E[U(w_i, u_i)] \quad (1)$$

where p_i and w_i are entrepreneurial profit and wage respectively and e_i and u_i capture non-pecuniary benefits related to the way the income is earned[3]. Given the distribution of

[3] For entrepreneurs this can be the desire for independence, having no boss, responsibility for results, ability of planning the own labour schedule, while wage workers may derive utility from income stability, relative job security in larger organisations, possibly higher leisure time and so forth.

profits and wages, the decision to become entrepreneur is then approximated by the following equation[4]:

$\bar{p} - \frac{1}{2} r(\bar{p})\, var\,(p) >= \bar{w} - \frac{1}{2} r(\bar{w})\, var\, w$ (2)

where $\bar{p}$ and $\bar{w}$ are the expected entrepreneurial rent and the expected wage respectively, var (p) and var (w) are the variance of the distribution of profits and wages and r(.) stands for the coefficient of absolute risk aversion[5].

It follows that in economies where chances of finding a good job with associated income are small and, depending on the qualification of the individual, the variation in wages is high the decision will be tilted in favour of self-employment. It also follows that, if both profits and wages are highly uncertain, the net difference in expected profits versus expected wages will play a minor role in determining the outcome as high risk due to variability in both profits and wages will dominate the relationship. The actual outcome will also depend on the risk attitude of the individual, reflected in the coefficient of absolute risk aversion.

In line with the existence of uncertainty and informational shortages at the level of the individual decision, an interesting approach is developed by the models of learning (Jovanovic, 1982, Dosi et al. 1993, Pakes and Ericson, 1990). They assume that individuals enter into self-employment without a priori knowledge about their true managerial efficiency. Once established in the industry they discover their level of managerial efficiency in a Bayesian learning process. The learning process is responsible for growth or exit of firms over time as the managers discover that their efficiency level is higher, respectively lower, than initially estimated. Ex ante knowledge, acquired through working experience in the industry, apprenticeships or an entrepreneurial family tradition, sharply increases an individuals ability to make correct guesses about his post-entry managerial efficiency and expected profit. Ex-ante learning thus reduces considerably the risk of starting a venture and enhances an individual's propensity to start-up a business.

In empirical studies human capital and managerial ability are proxied by formal education, age, labour market experience and experience in self-employment. Empirical studies on entrepreneurship in developing countries indicate a higher level of formal education among entrepreneurs than for the population as a whole. A direct relationship is found between formal education and success of the entrepreneur (Nafziger, 1988).

However, for younger individuals formal education and working experience are to some extent alternatives for acquiring skills. This is especially the case for craftsmen, whose

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[4] The decision to become an entrepreneur can generally be approximated using Taylor's theorem in terms of the first and second order moments of the distribution :

$U(\bar{p}) + 1/2\, \mathrm{var}(p) U''(\bar{p}) \geq U(\bar{w}) + 1/2\, \mathrm{var}(w) U''(\bar{w})$

where $\bar{p}$ = E[p], $\bar{w}$ = E[w] and U"(p) and U"(w) stand for the second order derivative of the individual utility function.. In terms of certainty equivalents, assuming the certainty equivalents for both uncertain profits and wages p and w to be close to the respective mean values $\bar{p}$ and $\bar{w}$, the decision is ruled by the following equation:

$\bar{p} - \frac{1}{2} r(\bar{p})\, var\,(p) >= \bar{w} - \frac{1}{2} r(\bar{w})\, var\, w$

[5] $r(\bar{p}) = -(U''(\bar{p})/U'(\bar{p}))$ and $r(\bar{w}) = -(U''(\bar{w})/U'(\bar{w}))$

training requires a lengthy apprenticeship. Apprenticeship arrangements are important in Africa because they provide training in specific occupations that are in demand and allow the apprentice to acquire the whole range of skills necessary to copy independently and successfully the activities of the master.

1.2. Barriers to entrepreneurship and firm growth

Not all individuals willing and capable of starting up a business are in the possibility to do so. Insufficient capital to start-up a business or to expand activities is among the most important economic barriers to small firm development. Recent empirical findings suggest that capital markets discriminate against individual entrepreneurs and entrepreneurial firms and they point at the role of personal and informal financing, implying that the entrepreneur takes the risk of his venture. Evans and Leighton (1989) find that switches from wage employment to self-employment are more likely if the individual disposes of more assets. In a similar view Evans and Jovanovic (1989), Blanchflower and Oswald (1990), van Praag and van Ophem (1994) and Holtz-Eakin et al. (1994a and 1994b) find empirical support for binding liquidity constraints using U.S. or U.K. data.

In developing countries liquidity constraints are even more pronounced as credit markets are relatively underdeveloped and transaction costs in formal financial markets are very high, especially for small and medium sized enterprises. Most entrepreneurs have to finance their venture with own savings and they bear the risk of their activities themselves. A description of the importance of informal financing methods in Côte d'Ivoire is provided by Lelart (1995).

Furthermore, social and psychological factors can influence an individual's propensity to start up a business in many ways. The gender factor has increasingly received attention. Despite a number of exceptions, only a small proportion of large-scale entrepreneurs in developing countries are women. Very often cultural norms impose restrictions on the possibilities of women to become self-employed. 'A comparison of research on female entrepreneurs in different developing countries reveals that women in every country face problems of access to credit, business knowledge, technical and business education and technological information; their businesses start smaller and grow more slowly than men's businesses overall;' (Stevenson, 1988). Nevertheless, some authors claim that women do possess a number of characteristics that can give them an entrepreneurial advantage over men (Peterson, Weiermair, 1988)[6].

According to Kilby (1983) alien minorities have an entrepreneurial advantage[7]. In a similar view Elkan (1988) argues that entrepreneurial talent is often generated by ethnic or

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[6] 'Psychological research suggests that women are more communicative than men, show a greater interest in other people and are more sensitive to contextual and emotional forms of communication. This suggests that women entrepreneurs are better networkers and better suited to service sector firms because they are better able to establish trust relationships when dealing with customers' (Peterson, Weiermair, 1988).

[7] 'First, (...) they have possessed a superior initial endowment of capital, market and technical knowledge, and acquired traditions. Second, external environmental parameters - limited occupational choice, the intensifying effect of the never-distant threat of expulsion, greater freedom to undertake extra-legal arrangements - tend to strengthen entrepreneurial performance. Lastly, enforced cooperation with fellow

religious minorities. The mere fact of belonging to a minority may create a feeling of insecurity which encourages people to seek economic success.

Many other cultural and sociological factors can interact in the decision process of the individual. Shapero and Sokol (1982) stressed 'displacement'[8] as a sociological factor for entrepreneurship. Among the psychological factors the most frequently mentioned are the locus of control[9] , the need for achievement[10] and the attitude towards risk. As entrepreneurship involves important risk-bearing less risk averse individuals are found to be more likely start up a business.

2. Who are the entrepreneurs: an empirical model

The RPED survey collected personal data of over thousand individuals, some of whom are entrepreneurs while others are wage workers in the manufacturing sector in Côte d'Ivoire. The data set allows to describe the personal characteristics which distinguish entrepreneurs from wage workers[11].

Data on formal education, previous working experience, apprenticeship, the individual's age, gender and ethnic origin were available and complete for 133 entrepreneurs and 806 employees. These data were pooled into one data set. A logit model is used to relate the probability of being an entrepreneur to the personal characteristics of the individual, his managerial and working skills and his (expected) wage :

$$\Pr(ENTR_i) = \frac{\exp(a + bX_i + gW_i)}{1 + \exp(a + bX_i + gW_i)}$$

where X_i is a vector with the personal characteristics of the individual, including his managerial abilities, and W_i is his wage. Expected wages for entrepreneurs are estimated following a wage equation relating wages to characteristics of individuals, including age, gender, ethnic origin, education, training and working experience, and sector of activity.

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aliens as the sole path to survival builds up over time networks of trust which provide access to scarce information, to various risk-spreading arrangements, to credit on favourable terms, to influential people, and to a large pool of individuals to whom portions of managerial responsibility can be safely delegated' (Kilby, 1983, p.110).

[8] Displaced persons are persons whose life has been distorted in some way or another, for instance by frequent job losses or changes, a divorce, one or both parents died when the entrepreneur was a child. Due to these events people distinguish themselves from the 'normal' society and develop an attitude that is conductive to entrepreneurship.

[9] Persons with an *'internal locus-of-control'* are more likely to become successful entrepreneurs as they perceive the outcome of an event as within their personal control.

[10] McClelland (1961) argues that persons with a high *need for achievement* are more likely to behave like an entrepreneur, to take personal responsibility for decisions, to prefer decisions involving a moderate degree of risk and to show interest in knowing the outcome of the decisions. They are attracted to entrepreneurial positions whenever society accords high prestige to these occupations.

[11] Ideally, with the use of longitudinal data, it would become possible to identify the factors which determine individual's swiches into or out of self-employment. Instead the data available provide information about individual's occupation at one single moment, as it results from sustained decisions in the past.

Managerial abilities are proxied by variables on formal education, professional experience and apprenticeship. Three binary variables capture the effect of formal education: PRIMARY, equalling one if the individual has obtained a certificate of primary school, SECONDARY equalling one if the individual has a certificate of technical or classical secondary school, and HIGHEDUC, equalling one if the individual has obtained a university or equivalent degree in Côte d'Ivoire or abroad or if he has obtained a certificate of advanced technical school. Professional experience is proxied by the logarithm of the age (AGE) and by a binary variable equalling one if the individual has previously acquired experience in the same industry of his current activities (EXPER). Experience acquired through a former apprenticeship is captured by the binary variable APPR.

For lower levels of formal education, apprenticeships are often viewed as an alternative way to acquire basic skills. To test for the simultaneous effect of formal education and apprenticeships, a set of variables is included regrouping the individuals into 6 different mutually exclusive educational groups. The reference group are individuals who have never been apprentice nor have received any formal education. APP0 equals one if the individual has been apprentice but has received no formal education. APPPRIM equals one for individuals who have been apprentice and also obtained a certificate of primary school. APPSEC equals one for individuals who have been apprentice and also obtained a secondary schooling certificate. The variables PRIM and SEC equal one if the individual has never been apprentice but has obtained instead a certificate of primary respectively secondary school. Apprenticeships are rare among the individuals who have received higher formal education.

To measure the sociological effects of gender and ethnicity on the probability of being an entrepreneur the binary variables FEMALE and NONAFR are included, equalling one if the individual is female, respectively a foreigner of non-African origin. Table 1 shows the sample mean values for the variables included in the model.

INSERT TABLE 1 HERE

Estimation results

The results of the estimation are presented in table 2. The first column presents a basic model, in the second column the analysis is refined to account for substitution between lower levels of formal education and apprenticeships.

The coefficients of the variables which capture the different aspects of managerial ability are positive and significant. An individual is more likely to be an entrepreneur if he has previously acquired experience in the same sector. Calculated at the sample mean values the probability of being an entrepreneur increases with 0.16 if the individual has experience in the same sector of activity. A similar significant relationship is found for the variable LAGE.

From the variables capturing formal education and apprenticeships it becomes clear that entrepreneurs can be found mainly among two relatively different groups of individuals: those who have followed an apprenticeship on the one hand and those who have obtained

an academic degree on the other hand. In the first column the coefficient for DAPPR and HIGHEDUC are significant at the 99% level. An apprenticeship increases the probability of being entrepreneur with 0.08. Higher education tends to increase the probability of being an entrepreneur with 0.18.

The second column unravels the interaction between lower levels of education and apprenticeships. It indicates that for those who have received no formal education at all, an apprenticeship seems to be the way to acquire experience and skills which allow and motivate the individual to become entrepreneur. By doing so, uneducated individuals might avoid the low wages paid for unskilled labour in the manufacturing sector. The variable APP0 has a relatively large coefficient and is significant at the 99% level. Estimated at the sample means, the apprenticeship increases the probability of being an entrepreneur for individuals without formal education with 0.21.

For persons with some degree of formal education, an apprenticeship still increases the probability of being an entrepreneur, but the effect is less strong as is suggested by the coefficients of the variables APPPRIM and APPSEC. Lower levels of education seem to increase individuals' opportunities as wage worker in the Ivorian manufacturing sector, relative to being an entrepreneur. As wages in the manufacturing sector increase with the level of formal education, the opportunity cost for the individual's self employed labour tends to increase. This hypothesis is also supported by the variables PRIM and SEC which are positive but not significant, indicating that lower levels of education do not lead to a significant increase in entrepreneurial activity.

Higher levels of formal education however seem to pay-off for entrepreneurs and increase again an individual's propensity to entrepreneurship. Hence, becoming entrepreneur seems to be the best option for highly educated persons but also for individuals who have received no or little formal education but who instead got trained on the job during an apprenticeship.

INSERT TABLE 2 HERE

Contrary to what would be expected, females are relatively overrepresented among the entrepreneurs. The probability of being an entrepreneur increases with 0.12 if the individual is female. Yet, the number of female entrepreneurs is in general relatively low in the industrial sector. The entire sample includes only 12 female run firms versus 129 male run enterprises. The positive effect of female on the probability of being an entrepreneur is probably due to the fact that wage work by women is uncommon in industrial firms and limited to a few administrative functions in larger firms.

The binary variable for non-Africans has a very large positive coefficient, significant at the 95% level. The propensity towards entrepreneurship seems much larger for non-Africans in Côte d'Ivoire than for Africans. This can partly be explained by the fact that few foreigners come to work in Africa at less favourable conditions than they would find in their own country. Most non-African immigrants are motivated by the many opportunities to develop new businesses in Africa.

There exists a negative relationship between wages and the propensity towards entrepreneurship. For non-Africans however, the effect is much stronger than for Africans as is suggested by the interaction term. One possible explanation for this finding relies on the assumption of a non-competitive labour market with wages above market clearing levels. The data include only individuals who actually obtained one of the scarce jobs and may therefore not relate to the expected wage of an individual. The expected wage is also determined by the probability of finding no job and the related zero-income or at most the unemployment benefits. The opportunity cost for entrepreneurship, namely the expected wage, should therefore be corrected (reduced) for the risk of unemployment which tends to be higher among the Africans.

Another explanation is that, if capital constraints are binding for the start-up of the firm, only the more wealthier Africans or those who have an (expected) wage high enough to do some savings are able to start up a business. There are indeed indications that entrepreneurs have faced important capital constraints when starting their business. The great majority of entrepreneurs reports to have used their personal savings as start-up capital. Table 3 shows the importance of informal financial sources, such as own savings and help from friends and family, which average up to 93.6% of start-up funds. These two informal sources are even more important for micro-enterprises and small and medium sized enterprises (100.0%, 93.5% and 91.3% of the start-up funds respectively) and for African non-Ivorian entrepreneurs who had to rely entirely on these informal sources. African foreigners are apparently a group of people for whom access to credit is most difficult. Relatives and friends seem to serve as substitute bankers.

INSERT TABLE 3 HERE

3. Growth of entrepreneurial firms

While apprenticeships, experience, higher levels of human capital stock and financial considerations stimulate individuals to be entrepreneur, as suggested by the previous section, the purpose of this section is to analyse which factors determine whether an entrepreneur is successful and succeeds in making his business grow into a larger size, when all other structural characteristics related to the industry are controlled for. In other words, it is of interest to know to what extent the growth performance of firms after start-up is affected by the factors related to the entrepreneur, relative to other more structural growth determinants which are advanced by the literature on firm growth.

The theory of firm growth has many years been inspired by Gibrat (1931) who considered firm growth as a random process, i.e. firm growth rates are distributed independently of firm size. A class of stochastic growth models developed subsequently combined Gibrat's Law with a range of weaker assumptions (Ijiri and Simon, 1977). Meanwhile empirical studies conducted over different time periods, different countries and covering several manufacturing industries demonstrated that Gibrat's Law fails as a significant negative

relationship seems to exist between firm growth and firm size (Kumar, 1985; Evans, 1987a; Acs and Audretsch, 1990; Dunne and Hughes, 1994)[12].

One explanation for the observed negative size-growth relationship may be due to the existence of economies of scale in certain industries. Firms operating below the minimum efficient scale which are unable to overcome the diseconomies of scale are forced out of the industry. The more efficient firms grow faster than larger counterparts as they overcome their initial scale disadvantage investing gradually and more than larger firms. Audretsch (1995) finds supportive evidence for the hypothesis that a larger gap between the MES and firm size is related to higher growth rates of surviving firms. Evans and Jovanovic (1989) on the other hand show that liquidity constraints influence investment decisions. Since cash constraints are expected to be less binding after start-ups, cash constrained start-ups should expect higher than average growth rates. This effect induces a negative relationship between an entrepreneur's income or the firm's initial size and growth.

More recently, the growth of firms is viewed as a post-entry learning process (Jovanovic, 1982; Pakes and Ericson, 1990). Once firms are operating in the industry the achieved profits reveal information about the true efficiency level of the firm and managers adjust the firm's scale of operations accordingly (Jovanovic, 1982). Pakes and Ericson (1990) elaborated the model allowing individuals to improve, and not just uncover, their level of managerial ability through human capital formation in a process of active learning. The learning process implies a negative age-growth relationship, as for younger firms there are still more opportunities for learning. Firms ran by entrepreneurs possessing a larger human capital stock should be more efficient, thereby growing relatively faster.

A growing body of evidence supports this evolutionary view. The relationship between firm age and growth is found to be negative in a number of empirical studies (Evans, 1987; Dunne and Hughes, 1994). Variability of firm growth tends to decrease as firms grow older (Evans, 1987a; Dunne, Roberts and Samuelson, 1989). A positive relationship between the level of human capital of the proprietor, reflected in age and education, and the longevity of small businesses is found by Bates (1990) for US firms. McPherson (1996) finds for five African countries that firms of experienced, educated and trained proprietors grow more rapidly than those of proprietors possessing smaller stocks of human capital. Nafziger and Terrell (1996) on the other hand find that education of the founding entrepreneur reduces firm survival, indicating that opportunities of entrepreneurs outside the firm are important in analysing firm development.

In the context of developing countries, institutional economist view the growth process of firms and the resulting market structure as subject to a number of institutional factors. The relative development of markets and institutions and the transaction costs which result

[12] Gibrat's law is also questioned by studies finding the variability of growth rates to decrease with firm size (Hart, 1962; Mansfield, 1962; Hymer and Pashigian, 1962; Singh and Whittington, 1975, Hall, 1987; Dunne and Hughes, 1994, among others). Some studies find there is correlation in the firm growth rates over time, in the sense that a firm which achieved rapid growth in one year tends to grow relatively rapidly in the following year (Kumar, 1985; Wagner, 1992).

from ill developed markets may favour some firms and hamper others in their growth[13]. In a similar line of reasoning, organisational ecology models recognise that besides competition for scarce resources, legitimation in the industry is another important process by which resources are allocated and firms grow[14]. Evidence is found that firm growth in developing countries is a complex process in which institutional and structural factors interact with a dynamic learning growth process of firms (Sleuwaegen and Goedhuys, 1997; Goedhuys and Sleuwaegen, 1998) [15].

4. Determinants of the growth of entrepreneurial firms in Côte d'Ivoire

This section develops an empirical model to test whether the same relationships hold for firms in the manufacturing sector in Côte d'Ivoire which operate in markets characterised by relatively high transaction costs. The estimating equation follows the structure proposed by Evans (1987) and consists of a second-order approximation of a general growth function in age and size.

$$\frac{\log(S_{t'})-\log(S_t)}{d} = a+b_1\log(S_t)+b_2\left[\log(S_t)\right]^2+b_3\log(A_{t'})+b_4\left[\log(A_{t'})\right]^2+$$

$$b_5\log(S_t)*\log(A_{t'})+\sum_{i=1}^{n} b_i X_i$$

where $S_{t'}$ and S_t are the size of a firm in period t' and in period t respectively, $A_{t'}$ is the age of the firm in period t', and d = t'-t, the period over which growth is measured. The model is extended by a linear combination of variables X_i to take into account the effect of institutional factors and human capital embodied in the entrepreneur.

The dependent variable is the average annual growth rate of sales[16] calculated over a five year period from 1989 until 1994[17].

Following the estimating equation the set of explanatory variables includes firm size and firm age. Size is measured at the beginning of the period under consideration, age is measured in 1994. Both size and age are in logarithmic terms.

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[13] See for instance Nabli and Nugent (1989) for the effect of transaction cost on the size distribution of firms and Nugent and Nabli (1989 and 1992) for the effect of the relative development of financial markets on firm size distributions.

[14] In the organisational ecology approach firms essentially compete for scarce resources. To the extent firms have access to a larger range of resources, their growth opportunities increase. Legitimation or institutionalisation refers to the social acceptance of an organisational form. An organisational form is institutionalised or legitimated to the extent that it has a taken-for-granted character, which provides it with a reputation of reliability and credit and trustworthiness in the eyes of consumers, suppliers, banks, law enforcing agencies and other key actors. Legitimation is stronger than competition in new or thin markets (Hannan, Carroll, 1992).

[15] Using data of manufacturing firms in Côte d'Ivoire and Burundi, firm growth is explained by size and age effects as a result of efficiency seeking through scale enlargements and learning, but it is strongly moderated by processes of diffuse competition through which firms compete for resources and by formal legitimation in the industry.

[16] Sales data are taken instead of employment data because a small firm or microenterprise can expand its sales considerably before hiring a new employee. The employment growth analysis would therefore hide a more continuous growth process, especially for smaller firms.

[17] For firms which were created after 1989 growth is measured over the period of existence.

Among the structural variables a first set of variables defines the firms' sector of activity. The economic performance of the different sectors can be responsible for some firms to grow faster than others. Three binary variables, FOOD, WOOD, METAL are employed for firms in agro-industries, woodworking respectively metalworking, the reference group being firms in the textiles sector. To measure to what extent legitimation in the industry is important, a binary variable FORMAL is used which takes the value one if the firm has a formal status and zero if the firm is operating in the informal or semi-formal sector[18].

Human capital is measured by the extent to which the entrepreneur has received formal education. Three binary variables PRIMARY, SECUNDARY and HIGHEDUC capture the highest level of education the entrepreneurs have actually obtained and are defined as earlier in the text. The reference group are entrepreneurs without any formal education.

General experience is captured by the age of the entrepreneur in logarithmic terms (ENTRAGE). A large majority of entrepreneurs has been apprentice or has acquired working experience in the same sector of activity previously to starting the business. To measure this effect a binary variable is included which takes the value one for those entrepreneurs who lack this experience (UNEXPER). The effect of job specific experience acquired through an apprenticeship is measured by the variable NOAPP which equals one if the entrepreneur has not been an apprentice previously, the reference group being the majority of entrepreneurs with the experience of a past apprenticeship. As suggested by the findings earlier the text, an apprenticeship tends to stimulate the decision to become self-employed. However, as apprenticeships tend to be more focused on the technical than on the managerial aspects of the profession, it is not straightforward that an apprenticeship will enhance an enlargement of the scale of activities which would imply that the entrepreneur becomes more involved in administrative and managerial activities rather than being a self employed production worker.

Two socio-economic characteristics of the entrepreneur are withheld. A binary variable is included to capture gender effects. The variable FEMALE equals one if the entrepreneur is female. To measure the effects of financial or liquidity constraints on the growth opportunities of the firm a binary variable is included which equals one if the entrepreneur possesses no real estate, no transport vehicle nor any other asset which could possibly serve as collateral for a bank loan (NOCOLLATERAL). This measure reflects both the entrepreneurs lack of personal wealth and savings for financing investments and daily operations as well as his lack of access to external financing due to missing collateral.

Estimation and results

The model is estimated with a two stage least squares where the fitted values of a probit equation, explaining the probability that a firm is formally registered, are entered into the growth equation (Barnow et. al, 1981). This procedure is adopted to account for the

[18] In line with other studies (McPherson and Liedholm, 1996; Mead and Morrisson, 1996) firms are defined as 'formal' if they are registered, submit records yearly with the 'Banque de Données Financières' (BDF), fulfil all tax obligations including VAT, company taxes and business license taxes at local and national level, and respect labour and other regulations. Informal firms pay at most local business license tax (*'patente'*). Semi-formal firms don't keep full records but nevertheless pay some taxes on turnover.

possible bias originating from endogeneity of the variable FORMAL. It should also be noted that only surviving firms are included in the data set. A recent study by McPherson (1996) on the growth of firms in five southern African countries analyses the possible selection bias resulting from the exclusion of exiting firms on the growth relationship and finds this bias to be insignificant.

Table 4 shows the estimated coefficients and t-ratios for the growth regression. The average annual growth rate equals 0.035 or 3.5%.

INSERT TABLE 4 HERE

The relationship between size and growth is negative, implying that smaller firms grow faster than larger ones. The quadratic term of size is positive and significant at the 99% level indicating that the negative effect of size on growth diminishes for larger size classes. The partial derivative of growth to size evaluated at the mean value of age and size is negative (-0.10). The elasticity of end-of-period size with respect to beginning-of-period size equals 0.54.

In estimating the age effect, the restriction of fixing the coefficient of squared age to zero could not be rejected. Hence, the extra column presenting the restricted model. Evaluated at the sample mean, the relationship between firm age and growth in terms of sales follows the inverse pattern suggested by the models of learning. At the sample mean the elasticity of size with respect to age equals 0.14 and 0.12 for the unrestricted and the restricted model respectively.

The coefficient of the variable FORMAL is large and positive. The formal status increases the growth rate by 0.44. This result indicates that the process of legitimation through formal registration is important in Côte d'Ivoire. Resources appear to be allocated to firms benefiting from a reputation of trustworthiness, creditworthiness and quality towards banks, suppliers, consumers and government officials. Belonging to the formal sector increases firms' transparency of activities and lowers transaction costs. Moreover the formal status gives the firm the opportunity to advertise itself in the industry and grants the firm legitimation in the business environment.

Whereas an apprenticeship, or former experience are found to be factors with a strong positive effect on individuals' propensity towards entrepreneurship, they do not seem to have any influence on the firm's post-entry growth performance. The same is true for the age of the entrepreneur. Through ageing the entrepreneur has been able to develop a more precise knowledge about his entrepreneurial and managerial abilities and the changes in the scale of operations tend to be smaller, an effect which offsets the higher human capital embodied in older persons.

Instead, formal education seems to influence gradually and positively the firm's growth performance. For secondary and higher education the effect is significant at the 99% level. The achievement of secondary school increases the expected growth rate by 0.27, a university degree increases the growth rate by 0.41. These findings show that, while entrepreneurs are found among the former apprentices and the highly educated individuals, the most successful entrepreneurs are found in the latter group. Apprenticeships enhance

the choice for entrepreneurship, but rather for small scale activities which require high technical skills and little managerial ability and business organisation. The findings are in line with the results obtained by Vijverberg (1991) that occupational experience, nor apprenticeships contribute to superior firm performance.

Female run firms seem to grow more slowly, which is in line with studies indicating that female entrepreneurs are more restricted in their access to inputs and operate in a more restrictive environment. The results also suggest that post-entry financial constraints are an important growth hampering factor. Other things equal, a lack of assets on behalf of the entrepreneur reduces the growth rate by 0.35.

5. Conclusion

This paper analyses two key elements of entrepreneurship in Côte d'Ivoire: it analyses the factors which make an individual more inclined to start-up his own business and the determinants of entrepreneurial success measured in terms of firm growth. Starting a business independently is characterised by uncertainty and risk. Entrepreneurial activity is therefore more likely to be undertaken by individuals who succeed in reducing the risk and increasing their entrepreneurial abilities through a process of learning that takes place both before and after entry.

Entrepreneurs are found to originate mainly from two different groups of individuals. Individuals tend to enter into self employment after an apprenticeship during which all technical skills are acquired to replicate the activities of the master. Once established these individuals do not succeed in making their business grow, probably because operations on a larger scale require more managerial than technical capacities to overlook and coordinate the business. Individuals who have received advanced formal education also tend to become self employed, and their businesses grow faster. Formal education seems to increase gradually and sensibly the learning capabilities of the individual. This obviously reaches its full extent in the ex-post phase, as formal education implies an initial loss of practice and on-the-job training. The learning process tends to take place at a later stage as high-potential managers catch up experience and adjust to their relatively higher efficiency levels.

Younger firms grow faster than older firms, as for younger firms there are more learning opportunities which remain to be exploited. Former working experience and the ageing of the individual have a positive impact on entrepreneurship in that they reduce the risk of the venture. They give the individual the opportunity to develop a more precise estimate of the profits he could possibly make as self-employed. These factors do not have a significant effect on the post-entry performance of the firms.

Entrepreneurship is largely determined by institutional factors. A large difference in entrepreneurial propensity is observed between Africans and non-Africans. Occupational choice models suggest that individuals compare the wages that can be earned to the profits from self-employment, with higher wages reducing the propensity to start an own business. The data show that the expected or actually earned wage indeed has a negative impact on entrepreneurship for non-Africans. However, this effect is much smaller for the Africans.

This might imply that the wages earned by Africans do not fully reflect the opportunity cost for entrepreneurship. As the data set does not include unemployed individuals, but rather and only those who had the luck and opportunity to get a paid job, the relevant expected wages for Africans are upward biased and should be reduced for the risk of unemployment.

Besides labour market imperfections, the underdevelopment of financial markets might also hamper Africans' choice of self-employment. It is clear from the survey data that Africans have more limited access to formal bank loans to finance the start up of a business than their non-African counterparts. Financial constraints remain important even in the post-entry growth process. A lack of personal wealth of the entrepreneur dramatically reduces a firm's expected sales growth rate. This indicates that personal savings are important to finance activities and that banks refrain from financing operations if collateral can not be provided.

The high transaction costs and asymmetries in information in financial markets induce that resources are allocated on the basis of other criteria. Firms with a more legitimate status in the industry, keeping records, fulfilling tax obligations, respecting labour and other regulations tend to have easier access to necessary inputs. These firm characteristics are captured by the formal status of the firm, a variable which drastically improves a firms growth opportunities as it opens up the path to scarce inputs such as bank loans, licences, skilled labour, infrastructure and business support services. For that reason firms of larger size with an established reputation face better growth opportunities, thereby perpetuating the weak presence of medium sized firms in African manufacturing.

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Appendix. Size distribution of firms by period of establishment, sector of activity, origin of equity capital and legal and formal status

	Number of firms	1-4	5-49	50-99	100-249	250+	Average employment
All firms	141	47	67	16	5	6	43
Established in:							
1952-69	10	1	5	1	1	2	167
1970-79	27	5	12	4	3	3	86
1980-1986	35	9	20	4	1	1	33
1987-95	69	32	30	7	0	0	15
Sector :							
Agro-industries	22	0	17	2	2	1	40
Textiles	48	25	17	5	0	1	34
Wood working	42	18	14	4	3	3	62
Metal working	29	4	19	5	0	1	34
Legal status							
Sole proprietor	88	46	41	1	0	0	8
Association	2	1	1	0	0	0	3
Limited liability (SARL)	33	0	19	9	3	2	71
Corporation	18	0	6	6	2	4	173
Origin of equity capital :							
Ivorian	69	23	36	6	3	1	23
Other African	35	23	11	1	0	0	8
European	27	0	15	6	2	4	138
Asian	10	1	5	3	0	1	54
Formal status							
Informal	52	41	11	0	0	0	3
Semi formal	22	5	17	0	0	0	9
Formal	67	1	39	16	5	6	86

Table 1. Summary Statistics

Variables	Non-Africans N=52	Africans N=887	Total sample N=939
Entrepreneur	0.7308	0.1071	0.1416
LAGE	3.7933	3.5390	3.5531
EXPER	0.6346	0.3641	0.3791
APP	0.2115	0.4713	0.4569
PRIMARY	0.0962	0.3337	0.3206
SECONDARY	0.4615	0.2390	0.2513
APP0	0.0577	0.2255	0.2162
APPPRIM	0.0000	0.1680	0.1587
APPSEC	0.1154	0.0643	0.0671
PRIM	0.0962	0.1657	0.1619
SEC	0.3462	0.1747	0.1842
HIGHEDUC	0.3654	0.0699	0.0863
FEMALE	0.0385	0.0970	0.0937
NONAFR	0.0000	1.0000	0.9446
INCOME	13.1912	11.1700	11.2820

Table 2: Results of the logit model on the probability of being an entrepreneur

intercept	-9.74***	-10.46***
	(2.54)	(2.57)
AGE	2.05***	2.23***
	(0.49)	(0.50)
EXPER	1.98***	1.98***
	(0.28)	(0.28)
APPR	1.09***	
	(0.28)	
PRIMARY	-0.60**	
	(0.30)	
SECONDARY	-0.45	
	(0.38)	
APP0		1.98***
		(0.54)
APPPRIM		1.21**
		(0.57)
APPSEC		1.16*
		(0.68)
PRIM		0.26
		(0.65)
SEC		0.55
		(0.64)
HIGHEDUC	1.58***	2.61***
	(0.49)	(0.68)
FEMALE	1.23***	1.26***
	(0.40)	(0.41)
NONAFR	22.28**	22.37**
	(8.94)	(8.95)
INCOME	-0.14	-0.20
	(0.23)	(0.23)
NONAFR*INCOME	-1.43**	-1.44**
	(0.68)	(0.68)
Observations	939	939
McFadden's R^2	0.321	0.330

Standard errors in parentheses; Significance levels: * 99%; ** 95%; * 90%.**

Table 3. Sources of start-up funds by size class and origin of equity capital

	1-4	5-49	50-99	100-249	250+	Ivorian	African	European	Asian	All firms
Own savings	78.3	79.0	91.3	79.6	56.0	77.4	76.4	86.5	83.0	79.3
Friends/family	21.7	14.5	0.0	0.0	0.0	13.6	23.6	5.8	10.0	14.3
Loan foreing bank	0.0	2.3	2.0	0.0	0.0	1.9	0.0	1.9	0.0	1.3
Loan local bank	0.0	0.3	6.7	20.4	24.0	1.8	0.0	5.8	7.0	2.5
Money lender	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.5
Supplier	0.0	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.7
Other	0.0	1.3	0.0	0.0	20.0	2.8	0.0	0.0	0.0	1.4

Table 4.: Determinants of growth of entrepreneurial firms over the period 1989-94.

Sales growth 1989-94		
Constant	1.024 **	1.001 **
	(0.461)	(0.439)
SIZE	-0.262 ***	-0.264 ***
	(0.050)	(0.050)
$SIZE^2$	0.012 ***	0.012 ***
	(0.003)	(0.003)
AGE	-0.120	-0.099 *
	(0.100)	(0.058)
AGE^2	0.007	-
	(0.020)	
AGE*SIZE	0.033 **	0.034 **
	(0.013)	(0.014)
FOOD	-0.070	-0.076
	(0.070)	(0.069)
WOOD	0.080	0.072
	(0.091)	(0.097)
METAL	0.097 *	0.092 *
	(0.055)	(0.054)
FORMAL	0.440 ***	0.445 ***
	(0.095)	(0.092)
PRIMARY	0.096	0.095
	(0.101)	(0.100)
SECONDARY	0.268 ***	0.265 ***
	(0.095)	(0.092)
HIGHEDUC	0.411 ***	0.411 ***
	(0.097)	(0.097)
ENTRAGE	-0.233 *	-0.229 *
	(0.127)	(0.124)
UNEXPER	-0.030	0.033
	(0.060)	(0.056)
NOAPP	0.008	-0.010
	(0.088)	(0.089)
FEMALE	-0.412 ***	-0.412 ***
	(0.112)	(0.111)
NOCOLLATERAL	-0.354 ***	-0.354 ***
	(0.094)	(0.094)
R-Adj.	0.536	0.549

Standard errors (in parenteses) are estimated using White's consistent estimator (White, 1980); Significance levels: * 99%; ** 95%; * 90%.**